Exploration of RPA Financial Intelligent Reviewer Robot Information Technology Mode in Financial Reimbursement of Colleges and Universities

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Abstract: With the swift progress of information technology, financial reimbursement in universities faces numerous challenges and opportunities. This paper examines the current state of financial reimbursement audit informatization in universities, such as system fragmentation, data silos, personnel capacity misalignment with digital transformation needs, mobile approval security risks, and industry-finance synergy mechanism failures. It then discusses technical architecture innovation, digital reengineering of the entire process, and a continuous optimization mechanism for the RPA Finance Intelligent Audit Robot System. Additionally, it proposes measures to ensure the smooth implementation of the RPA financial intelligent auditing robot, including building a "Trinity" support system, establishing a risk prevention and joint control mechanism, and promoting the balance of standardization and personalization. The aim is to provide useful insights for the reform of financial reimbursement informatization in universities and to advance the development of university financial management towards intelligence and efficiency.

Keywords: University Financial Reimbursement; RPA; Financial Intelligent Audit Robot; Informationization Model

1. Introduction

As an important place for knowledge transmission and innovation, the financial management of colleges and universities plays a crucial role in guaranteeing the smooth development of teaching, research and other activities. However, under the traditional financial reimbursement model, colleges and universities face many problems, such as cumbersome audit processes, inefficiency, and error-prone manual audits, etc. These problems not only affect the experience of teachers and students but also increase the financial risk. With the rise of robotic process automation (RPA) technology, financial reimbursement information reform for colleges and universities has brought a new opportunity. RPA financial intelligent auditing robot can simulate manual operation, and automatically complete the financial reimbursement audit process of the various tasks, with high efficiency, accuracy, stability, and other advantages, is expected to solve the financial reimbursement of colleges and universities in the field of the long-existing pain point problems. Therefore, an in-depth study of college financial reimbursement RPA financial intelligent auditing robot information technology model is of great practical significance.

2. Current Status of Financial Reimbursement Audit Informationization in Colleges and Universities

2.1 Coexistence of System Fragmentation and Data Silos

The financial data monitoring of colleges and universities directly under the Ministry of Education shows that the same college or university may implement eight types of fund management systems, such as the Measures for the Management of Funds for Projects Funded by the National Natural Science Foundation of China and the Measures for the Management of Funds for Philosophical and Social Science Research Projects in parallel. Take a comprehensive university as an example, its financial system needs to maintain seven sets of standard templates for reimbursement of scientific research, teaching and administrative expenses, resulting in a 34% return rate of

cross-departmental reimbursement documents. Worse still, the lack of data interface between the asset management system and the financial system has resulted in the duplicate recording of equipment worth 870,000 yuan in a laboratory, exposing the substantial risks posed by information silos. This situation of system fragmentation and data silos coexist, making the complexity of financial reimbursement audit work in universities greatly increased, and information between departments is difficult to share and synergize, seriously affecting the efficiency and accuracy of financial reimbursement.

2.2 Mismatch between Personnel Capacity and Digital Transformation Requirements

According to the research report of China Education Accounting Association in 2023, the financial team of colleges and universities presents the characteristics of "three lows": 58.7% of the personnel over 45 years old, only 31.2% of the personnel with the second level of computer certificate, and less than 15% of the personnel who have been trained in RPA technology. This structural contradiction has led to a provincial university deploying an intelligent auditing system, but 32% of the reimbursements still need to be manually audited twice. Typical cases show that some senior auditors mistakenly returned regular blockchain e-invoices due to unfamiliarity with the e-invoice authentication process, triggering complaints from research teams. There is an obvious mismatch between the ability of university finance personnel and the needs of digital transformation[1], which not only limits the effectiveness of the application of information technology such as the RPA Finance Intelligent Reviewer Robot in the field of university finance, but also hinders the improvement of the level of financial management in universities.

2.3 Mobile Approval Security Risks

With the promotion of the construction of the "smart campus", the mobile reimbursement approval volume of a "double first-class" university has reached 73%, but the security measures are lagging behind: ① 23% of the approval operations are completed in the public WiFi environment; ② a university financial APP has been A university finance APP had an unauthorized access vulnerability, leading to the leakage of bank card information of 78 teachers[2]. These hidden dangers seriously threaten the safe flow of hundreds of millions of dollars of education funds. In the context of the increasing popularity of mobile approval, the security of financial reimbursement in colleges and universities needs to be urgently resolved, otherwise it may lead to serious financial risks and information leakage.

2.4 Dysfunctional Industry-Finance Synergy Mechanism

Typical cases such as a university lateral research project reimbursement process: the project leader to submit→scientific research secretary of the initial review → financial commissioner verification→approval of the president in charge → bank payment, the average flow of 6 departments 11 links. The deep-rooted contradiction lies in the following: the data of budget management system and contract management system are not synchronized, resulting in a budget freeze of an industry-university-research project due to the difference in the time of arrival; the information of asset acceptance system is not connected with the financial system, resulting in the imported equipment valued at 1.35 million yuan not being able to be reimbursed in time due to the lack of tariff vouchers. The malfunctioning of the industry-finance coordination mechanism makes the financial reimbursement process of universities long and inefficient, which seriously affects the progress of scientific research projects and the development of teaching activities.

3. Advantages of RPA Financial Intelligence Review Robot in University Financial Reimbursement

3.1 Enhanced Audit Efficiency

RPA financial intelligent auditing robot can automatically handle a large amount of financial reimbursement data, and its processing speed far exceeds the manual audit. For example, in a pilot project in a university, an RPA robot can complete in just a few minutes of a complex research project reimbursement audit, while the manual audit

takes hours or even days[3]. This efficient auditing capability enables the university finance department to process reimbursement requests faster, reducing the time students and faculty spend waiting for reimbursement payments and improving the operational efficiency of the entire university.

3.2 Reduced Audit Error Rate

Since the RPA financial intelligent auditing robot is strictly in accordance with the preset rules and algorithms for auditing, without interference from human factors, its audit results are more accurate and reliable. In practical application, the audit error rate of RPA robots is much lower than that of manual audits[4]. For example, when dealing with invoice authenticity verification, the RPA robot can quickly and accurately determine the authenticity of invoices through real-time docking with the tax system, avoiding possible misjudgments in manual auditing. This not only improves the accuracy of financial reimbursement but also reduces the financial risks caused by audit errors.

3.3 Improved Financial Management Level

The application of the RPA Financial Intelligent Order Review Robot prompts the financial departments of universities to free themselves from the cumbersome daily audit work and put more energy into financial management planning, analysis, and decision-making. For example, financial personnel can use the large amount of financial data collected and organized by the RPA robot to conduct in-depth data analysis, providing powerful data support for the school's budgeting, cost control, and resource allocation[5]. This helps to improve the financial management level of universities and promote the sustainable development of schools.

3.4 Strengthened Data Security

The RPA financial intelligent auditing robot system usually has a strict security protection mechanism, which can effectively protect the security of financial data. For example, the system can use encryption technology to encrypt the storage and transmission of financial data to prevent data leakage and tampering[6]. At the same time, RPA robots will not be as susceptible to external attacks or malicious operations by insiders as they would be if they were operated manually, thus further safeguarding the security of financial data. This is crucial for colleges and universities because financial data involves the safety of the school's funds and the personal privacy of teachers and students.

4. Establishment of RPA Financial Intelligent Review Robot System

4.1 Innovative Technical Architecture of Intelligent Auditing System

Adoption of “cloud-edge-end” synergistic architecture: cloud deployment of the intelligent rules engine, integration of the Ministry of Finance, “Government Revenue and Expenditure Classification Subjects”, the Ministry of Education, “Financial System of Colleges and Universities” and other authoritative norms; edge set up distributed audit nodes, localized data processing; terminal equipped with a multi-spectrum scanner, can identify the value-added tax invoices, train tickets, taxi tickets and other 12 types of vouchers feature information, The terminal is equipped with a multi-spectral scanner that can recognize the characteristic information of 12 types of vouchers, such as VAT invoices, train tickets, and cab tickets. In the practice of a new engineering university, the system automatically accomplishes: ① bill compliance review (e.g. detection of consecutive cab tickets); ② dynamic monitoring of budget execution (early warning of deviation in the progress of scientific research fund utilization); and ③ intelligent apportionment calculation (automatic splitting of indirect costs for horizontal projects). This technical architecture innovation makes RPA financial intelligent auditing robot system can efficiently and accurately deal with all kinds of complex business in university financial reimbursement, greatly improving the efficiency and accuracy of financial reimbursement audits.

4.2 Full-Process Digital Reengineering Practice

The transformation path of a university directly under the Ministry of Education is of exemplary significance: the first stage realizes the full acceptance of electronic bills (including financial electronic bills, blockchain invoices and other 6 types); the

second stage builds an intelligent auditing workstation and develops the "three-color warning" function (green automatic over-auditing, yellow supplementary materials, red rule blocking); and the third stage opens up the direct connection channel between the bank and the university, making the payment of reimbursements more efficient and more accurate. In the third phase, the direct connection channel between banks and schools was opened, and the time limit for payment processing was compressed from 72 hours to 2 hours. As assessed by the China Accounting Association, the university's reimbursement satisfaction rate increased from 61 to 89, and the proportion of finance staff engaged in value-added services such as budget analysis reached 45%[7]. The practice of full-process digital reengineering not only optimizes the process of financial reimbursement in universities and improves the efficiency of reimbursement, but also promotes the transformation and development of financial personnel, bringing about a brand-new change in the financial management of universities.

4.3 Construction of Continuous Optimization Mechanism Strategy

Establishing a "double-loop" optimization system: in the inner loop, the recognition rate of fuzzy invoices is increased from 82% to 96% through continuous training of the bill recognition model by a convolutional neural network (CNN); in the outer loop, a policy rule base is built with the provincial Department of Finance, and the standards for 17 types of expenditures, such as travel expenses and conference expenses, are updated in real-time. The knowledge-sharing platform for cross-campus auditing of invoices led by the Department of Education of a province has deposited 23,000 pieces of typical case data, helping member universities to reduce the number of chargebacks for the same kind of problems by 42%[8]. The strategy of building a continuous optimization mechanism ensures that the RPA Financial Intelligent Audit Robot System can continuously adapt to the changes and development needs of the financial reimbursement business of universities, and improves the stability and reliability of the system.

5. Countermeasures for Ensuring Smooth Implementation of RPA Financial Intelligent Auditing Robot

5.1 Building a "Trinity" Support System

First, system security. With the development of an "intelligent auditing system management approach", and clear legal validity of electronic vouchers to determine the rules, a university accordingly standardized the electronic accounting file management process. Institutional security for the implementation of RPA financial intelligent auditing robot provides a clear specification and basis to ensure the legitimacy and effectiveness of the system.

Second, talent security. The implementation of the "Finance + IT" composite talent training program, a university of science and technology through the school-enterprise joint training, so that 35% of the financial staff to obtain RPA implementation consultant qualifications[9]. Talent security for the implementation of RPA financial intelligent auditing robot provides strong human support, and improve the technical level and business capacity of financial personnel.

Third, technical guarantee. Deploying a private cloud platform with Level 3 qualification, a university used quantum encryption technology to protect sensitive data transmission[10]. The technical guarantee provides reliable technical support for the implementation of RPA's financial intelligent auditing robot and ensures the security and stability of the system.

5.2 Establishment of Risk Prevention and Control Mechanism

The "four-dimensional risk control model" was developed: ① ex-ante prevention (setting up a function to remind travel expenses exceeding the limit); ② mid-control (implementing two-factor authentication for large-value fund payments); ③ ex-post audit (using AI technology to carry out a full-sample analysis of the reimbursement data); and ④ long-term supervision (introducing third-party organizations to carry out a system security assessment). After applying the model, a university successfully identified the violation of a research team's

fictitious academic conference to obtain funds, involving 230,000 yuan[11]. The establishment of the risk prevention and control mechanism has effectively prevented all kinds of risks in the financial reimbursement of colleges and universities， and safeguarded the safe flow of educational funds.

5.3 Promoting the Balance between Standardization and Personalization

On the basis of national standards such as Measures for the Management of Accounting Files and Measures for the Management of Financial Bills, colleges and universities are allowed to retain the specialization rules. For example, an art college has set up an art appraisal voucher audit module in the system to meet the special needs of the procurement of sketching materials; and a medical college has set up an automatic checking function for the reimbursement of animal experimentation fees for the results of ethical examination. This "commonality + individuality" design concept has increased the system adaptation rate from 78% to 95%. Promoting the balance between standardization and individualization not only ensures the universality and standardization of the RPA Financial Intelligent Audit Order Robot System but also meets the individual needs of different universities and improves the applicability and satisfaction of the system.

6. Future Development Trends of RPA Financial Intelligent Auditing Robot in University Financial Reimbursement

6.1 Continuously Improving Intelligence Level

With the continuous development of artificial intelligence technology, the intelligence level of RPA financial intelligent auditing robots will continue to improve[12]. For example, the robot will have a stronger learning ability, can automatically learn and adapt to the changes in the financial reimbursement business of universities, and constantly optimize the audit rules and algorithms. At the same time, the robot will also have natural language processing capabilities, and can directly interact with teachers and students to answer questions in the reimbursement process and provide more convenient services.

6.2 Cross-university Application and Data Sharing

With the continuous strengthening of cooperation between universities, the RPA financial intelligent auditing robot is expected to realize cross-college applications and data sharing[13]. For example, different colleges and universities can establish a unified RPA financial intelligent auditing robot platform to realize the collaborative processing of financial reimbursement business and data sharing. This will help improve the overall efficiency and management level of financial reimbursement in universities, and promote resource sharing and complementary advantages among universities.

6.3 Integration with Blockchain Technology

Blockchain technology has the characteristics of decentralization, non-tampering, security, and transparency, which can provide a more secure and reliable solution for financial reimbursement of colleges and universities. In the future, the RPA Financial Intelligent Order Review Robot will be combined with blockchain technology to realize trusted storage and sharing of financial reimbursement data[14]. For example, through blockchain technology, all aspects of financial reimbursement can be traced and verified to ensure the authenticity and integrity of the reimbursement data and improve the transparency and credibility of financial reimbursement.

7. Conclusion and Prospect

Under the background of the deep integration of digital economy and education modernization, the in-depth application of RPA technology is triggering the paradigm change of financial management in colleges and universities, and the application of RPA Financial Intelligent Reviewer Robot in financial reimbursement of colleges and universities provides a new way of thinking and methodology for solving the long-standing problems in the field of financial reimbursement of colleges and universities. Through the establishment of the RPA financial intelligent auditing robot system, colleges and universities can realize the automation, intelligence, and high efficiency of financial reimbursement audits,

improve the level of financial management, and ensure the safe flow of education funds. However, in practical application, it also faces challenges such as technical implementation difficulty, business process adaptability, personnel training and acceptance, and data privacy and compliance. In the future, with the continuous development and improvement of technology, the application of RPA Financial Intelligent Order Review Robot in financial reimbursement of colleges and universities is promising, and is expected to bring more profound changes to the financial management of colleges and universities.

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